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ABSTRACT

This study investigated the use of various forms of computer-mediated communication (CMC) to support the formation of a knowledge-building community (KBC) in teacher education. A KBC involves students working in small and large groups to solve "real world" problems, and in the process develop skills of negotiation, communication, and collaboration. Emphasis is placed on authentic problems that are linked to a school context. The findings showed that students preferred to use forums available to all participants. Also, they used the forums in ways that were not anticipated by the authors. Many students made use of other modes of CMC such as e-mail and synchronous forums downloaded from the Web. Many of the skills used in mediating face-to-face discussion could be transferred to the online situation. (Contains 21 references.) (Author)

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Supporting E-knowledge –building in teacher education: The use of computer-mediated communication

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Abstract

This study investigated the use of various forms of computer-mediated communication (CMC) to support the formation of a knowledge-building community (KBC) in teacher education. A KBC involves students working in small and large groups to solve 'real world' problems, and in the process develop skills of negotiation, communication, and collaboration. Emphasis is placed on authentic problems that are linked to a school context.

The findings showed that the students preferred to use forums available to all participants. Also they used the forums in ways that were not anticipated by the authors. Many students made use of other modes of CMC such as e-mail and synchronous forums downloaded from the Web. Also many of the skills we used in mediating face-to-face discussion could be transferred to the on-line situation.

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Key words: computer-mediated communication, knowledge-building community, teacher education

Introduction

Once Universities operated on the assumption that information would be stored centrally and scholars would come to this central store of knowledge and collaborate to produce more information but modern, digital information storage and telecommunications allow scholars to access information from any location connecting to the Internet. When information comes to people there are many benefits such as: direct access to a broader range of information; access to learning environments outside normal lecture and tutorial times; greater opportunity for experiencing a variety of instructional strategies including small group discussion and collaborative projects; and exposure to a forum for expressing and sharing ideas (Lockyer, Patterson & Harper, 1999). Some researchers claim that education that is entirely based on such technology contributes to a loss of community. For example, Besser and Bonn (1996) assert that it is difficult to build collaborative relationships among students, but Bonk and Cunningham (1998) showed that technology allows for genuine conveyance of human communication and learners can develop relationships regardless of the reduced cues associated with computer mediated communications.

This study contributes to the research by providing research evidence regarding the effectiveness CMC to foster the development of preservice teacher understanding of the values, norms, and habitual ways of seeing which belong to the teaching profession. This learning process relies on the integration of learners into a community of practice (i.e. the teaching community) and is facilitated through immersion in the discourse of the teaching community (Schon, 1983; Vygotsky, 1978). Such learning processes are "grounded in talk" and can stimulate higher order thinking skills by providing a context and mechanism for explanation, justification and reason (Duffy & Cunningham, 1996, p.181; Oliver, Omari & Herrington, 1997).

A knowledge-building community (KBC) in teacher education

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The KBC project provided students enrolled in an initial teacher education course with an alternative pathway to professional socialisation by forming a Knowledge-Building Community (KBC). Such professional socialisation occurs through the transmission of values, norms, and habitual ways of seeing which belong to particular occupations and shape the way that people conduct their work and establish themselves in the larger social world (Schon, 1983; Bowen & Marton, 1998). Some educators claim that distance education technologies cannot support such a process (Weedman, 1998), but we argue that distance education technologies *can support* this process *provided* it occurs within a defined knowledge-building community.

Berieter and Scardamalia (1993) describe a 'knowledge-building community' (KBC) as a group of people who investigate problems. Members work as groups and are engaged in progressive discourse in an iterative process of knowledge building. The Faculty of Education at the University of Wollongong wanted to use collaborative technologies to support the formation of a KBC and the model we adopted consisted of three interacting sources of learning:community-learning (CL) which involved students, university and school facilitators sharing knowledge as a community; school-based learning (SL) which involved the students in authentic school contexts; and problem-based learning (PBL) which involved students working in groups to investigate problems.

Using Computer Mediated Communication to support a KBC

The current study contributes to the understanding of how the students used the available CMC to support problem-based learning and their understanding of the teaching profession. Also, it investigated whether students were prepared to experiment with other forms of CMC if it better suited their purposes. We believed that CMC supplements face-to-face teaching by providing discussion forums that are non-threatening. CMC tools also allow individuals to maintain links with their community of practice and to take advantage of the scaffolding that is provided by a dynamic social context. Such links allow for legitimate peripheral participation (Lave & Wegner, 1991).

The Role of Problem-based Learning in the KBC

Problem-based learning (PBL) is a curriculum development and an instructional strategy designed to challenge students (Finkle &Torp, 1995). Originally developed for medical schools, it provides advantages for both acquisition of knowledge and development of problem solving skills in patient care (Barrows & Tambly, 1980). PBL challenges students to take charge of their education by involving students in small groups to solve 'real world' problems. Emphasis is placed on 'real world' problems that are 'ill-structured' (Gallagher, Stepien & Rosenthal 1992). Such problems: require more information to understand the problem, change as new information is added, require many perspectives to interpret information, and have no absolutely 'right' answer.

The Faculty of Education at the University of Wollongong decided to use a PBL approach to respond to studies that followed-up graduates of teacher education courses. Some studies reported that many students left university with feelings of being under-prepared for life in classrooms and confused by what confronted them when they arrived at schools (Armour & Booth, 1999; Ramsey, 2000). Others reported that schools which employed new graduates reported that a majority were unaware of how school and classroom cultures operated (MACQT, 1998; Ramsey 2000).

The literature about socialisation to the professions (eg Weedman, 1998, p1) contends that "professional socialisation is a complex and variable form of learning, highly collaborative in nature." It involves the transmission of social constructs, language, belief systems and symbolic lives that are unique to the profession (Schon, 1983). Brown and Duguid (1993) argue that this type of learning makes use of knowledge that must be "stolen" - the most important knowledge is that which cannot be taught and students must find ways to steal it from their educational environment.

The approach taken to the KBC course was influenced by financial constraints. One constraint was that we only had sufficient resources to offer the KBC course every alternate semester. Thus the KBC course was not offered students followed the 'mainstream' university course.

The first semester of our KBC course had two parts. The first part ran for five weeks and was designed to prepare students to work in a learning community amd they also developed teamwork skills as they acquired problem-solving skills. Another goal of the first part of the course was to prepare students to be what was called a 'teaching associate'. A 'teaching associate' supports a classroom teacher's work and may help teachers to; prepare and teach lessons, mark written work, read to children, have children read to them, run excursions, conduct sports training, supervise the school yard as well as a host of other functions that emerged as we gained experience with the program.

The second part of the KBC course ran for nine weeks. During this time students attended their host school for two days per week and attended university for one or two days per week. When they were in schools they had two main roles. One was to be an effective teaching associate and the other was to be what we called 'an educational anthropologist'.

The role of an educational anthropologist was to 'live' within the school community and to 'steal knowledge' (Brown & Duguid, 1993) that would help them to develop an understanding of the culture of their schools and of the actions of the children and teachers that they observed. Thus they needed to work with a number of teachers and allied professionals who acted as 'informants' about their profession and the culture of the school. As they gathered this information they would share it with others in their community.

Purpose of the study

The purposes of the study were:

1. To understand how members of the knowledge-building community made use of CMC to developed their understanding of the professional role of primary school teachers;
2. To describe the role that the lecturers took in mediating on-line discussion among members of the knowledge-building community.

The following research questions were posed:

1. How were the available forms of CMC used to develop an understanding of the professional role of primary teachers?
2. What were some of the limitations associated with the use of these communication technologies?
3. Did the members of the KBC use any other forms of CMC?
4. What role did the lecturers play in mediating the on-line discussions?

Participants

This initial study conducted in (1999) was limited to a group of 22 year one primary education students who were enrolled in the KBC course. The age of the students ranged from 18 years to 45 years and gender composition was three males and 19 females. All participants in this cohort were taught to use an asynchronous discussion space (DISCUS) during the 2^{d} week of the session. During the next week they had two additional one-hour training sessions that focused on the use of a private, small-group discussion space and an open forum (public discussion space). DISCUS could be accessed from their home computer, a group of 5 computers available in their university home room or from any of the computers connected to the university network.

Methods

Data were gathered from two sources: student interviews held half-way through the session and at the end of the session; and text downloaded from the various communication technologies used. The original criteria for classifying interview transcripts and downloaded text were based upon the three elements of the KBC community: community learning; school-based learning and problem-based learning.

Data pertaining to the lecturers' role in mediating on-line discussion came from post-session interviews with lecturers and analysis of text that students contributed to the discussion spaces. Names of students have been changed for the purposes of reporting findings.

Results and discussion

The results are organised under the following headings: community learning; school-based learning and problem-based learning. Under each heading the contribution of each mode of CMC is discussed. Finally, the ways in which the CMC were used and the roles the lecturers played in facilitating on-line discussion are described.

Community learning

Community learning (CL) was designed to support students as they embarked upon the other two sources of learning (PBL & SBL). Team building workshops were designed to engage students in learning experiences that allowed members to learn to work effectively with all members of their cohort. To enhance the community learning students were housed in a special 'home room'.

The asynchronous forum (DISCUS) was used to support community discussion. This allowed for individual discussion, intergroup, and intragroup discussion as well as lecturer input.

By the end of the preparation phase the students learnt to use the asynchronous discussion space (DISCUS) and e-mail and Kime and Karen commented.

It's been great. I have loved working in groups. I have had the best time. I have found that by working in a friendly environment you learn more. Kime 31.3.99

I don't think I am learning and then I go home and all this stuff comes out. I think where did that come from? We talk. If we have a problem we talk. One of my initial concerns about this course was that my friends weren't doing it and I thought that I would be on my own but just the opposite has happened. Karen 1.4.99

Several themes emerged. First, it appeared that friendship and community support assisted their learning because they felt comfortable in their environment and learnt through participation in face-to-face as well as via electronic conversation, and KBC class activities. Second, they were making effective use of the communication technology. They said that they had time to think and compose a response rather than quickly react as they often did in face-to-face interactions. Third, students preferred the community discussion space because everybody could contribute and follow all of the threads of the conversations. In response we removed access to the restricted discussion space.

School-based learning

After three weeks in schools the students were beginning to understand that teaching was a much more multifaceted and complex role than they first thought. Lisa discussed her views on the forum and said:

I had no idea of the preparation, organisation and behind the scenes work that teachers had to

do. I have had a respect for the work teachers do during the day, in school hours, but even in this I wasn't aware of the full extent of it ... Lisa 5.5.99

Susan, the most prolific user of CMC commented:

Teachers talk so much in the staffroom about different topics; it really is a collegial atmosphere. It's usually focused on different activities that are happening during the day and how they're going to coordinate them all. They all help each other out with the stuff that's going on. I was never aware of the intense preparation months before hand. My mentor was describing what they do to prepare for their program - all the infants' teachers get together before term starts and work out what they are going to do EACH day for the rest of the term! Each day, so far ahead! I kind of thought you worked it out the night before! Susan 12.5.99

The quotes indicate an increased awareness of teachers' work and similar views were expressed via different modes of CMC. It appears that in a short space of time the students were beginning to appreciate and witness the complex and multi-faceted roles of a teacher. Also, they could access a variety of modes of communication to express these ideas.

In addition students became aware that teaching requires high-level skills and practice is need to develop these skills. Importantly, students were gaining insights that teaching is a life-long commitment and requires life-long learning.

Problem-based learning (PBL)

The function of PBL was to extend student understanding of the professional role of teachers. PBL requires a great deal of honest and open communication and the preparation phase was used for this purpose. As Lave and Wenger (1991) assert the community does not necessarily have to be warm and effusive; instead it can be diffuse, fragmented and contentious and this was the case with several groups involved in this study. The following e-mail from Julia illustrates this point.

Initially I thought that we were unable to communicate effectively, as some people dominated the discussions while other people had good ideas that were not listened to... 14.5.99

Our inexperience in developing suitable problems for students also contributed to some confusion and general intellectual unrest. The first problem developed focused on the teaching of literacy skills to children (5 to 9 year olds). In retrospect we acknowledge that we suggested too many learning outcomes and this contributed to the silence that befell the room when we issued the first problem package. We needed to rethink our approach when we prepared our second problem which focused on the development of multiple intelligences in young children (Gardner, 1987).

Students who were reticent to voice their real opinions in class were more forthright in voicing their concerns through the discussion forum and via e-mail. For example, Susan said:.

I'm slowly dying. I am just so tired that I cannot think anymore. I am a zombie. This whole literacy thing is just so enormous. I hate assignments and I am so sick of this problem.
Susan 14.5.99

The combination of several new factors for the students (i.e the role of a teacher associate combined with the problem assessment task) prompted us to modify the problem so that we covered less material but to a greater depth and Julia's final e-mail about the second problem illustrates this point.

We were able to accomplish the second problem better as we had more knowledge of how to go about it, it wasn't as big as the first one. Julia 28.6.99

The role of computer-mediated communication

During the first three weeks, students made two to three entries per week. Of these, 13 used on-campus computers and the remainder used their home computers. The prolific users were those who had home computers and five owners of home computers were contributing up to 10 times per week. We allowed students continuous access to the forum during session breaks and into the next year. The rate of use remained much the same even though the students were no longer working as an 'official' knowledge-building community.

Students also made use of group and individual e-mails, but the asynchronous discussion space was the main means of electronic communication. It contained a total of 572 entries by the end of the first teaching session (13 weeks). During the session entries were printed and read by a research assistant who classified them into temporary categories. These categories were discussed with the research team who looked at the examples provided by the research assistant and made further suggestions. The process was repeated two more times and by the end of our final meeting all members of the team agreed with the categories. As a result the entries were classified as problem-related, school-related, group-related or personal. A large number school-related entries (95) were about how the students or their mentor teachers managed their classes. This finding appears to support the research reporting that beginning teachers are very concerned about classroom management during their initial teaching experiences (MACQT, 1998; Ramsey, 2000).

One group that were widely separated in terms of distance decided to use a synchronous discussion space that they downloaded from web (ICQ). The following quote shows the general tone of their conversation on this forum was about organising group tasks and group meetings.

Being a leader isn't that involved it just means keeping people on task....We'll see what we can get done on Thursday, I feel we need to focus and brainstorm etc and we need a peaceful place to do that. Fiona 4.5.99

At this stage we feel that the following comments can be made about the how students and the lecturers used the forum. However, caution is needed as the current use the forum represents a particular stage in our use of the technology and we acknowledge that this will change, as students and lecturers become more familiar with the PBL process and the technology.

The generalisations that we felt that we could make were:

1. The tone is one of communication about the problem, the school, the groups or assessment;
2. Controversial comments were delivered anonymously. For example one entry on the discus space said:

It is really a shame to see many people being all secretive and competitive. Please make an effort to try to limit the competition. We are all filling the vessel of information together..Anonymous 7.5.99

One member of the lecturing team was 'lurking' in the background and he took the opportunity to mediate the discussion. His entry follows:

...I think that it is healthy that we have a vehicle (discus) to express our comments publicly be anonymous or not. It is good that there are different perspectives on what we are doing and it is important that we stay open minded to hear these perspectives. Hoban 11.5.99

3. Without direction little deep knowledge-building happens through these modes of communication. We soon learnt that monitoring wasn't enough and that we had to contribute regularly, otherwise the discussion would go off at 'tangent' and deal with peripheral rather than core issues. Further, we feel that the strategies we used (e.g. encouraging contributions through positive reinforcement, allowing the debate to run until the discussion was peripheral, re-directing discussion, summarising points of view) mirrored those that we would normally employ in a face-to-face situation;

4. Initially, access to the technology at home restricted students as at least one person from each school group was not connected to the Internet at the start of the session. At the end of the year all had a home connection to the Internet;

5. CMC was a support and a catalyst for other modes of communication such as small group face-to-face meetings (formal and informal), large face-to-face groups (formal meetings at university) and numerous telephone conversations (informal).

Conclusion

We feel that the KBC concept supported by computer-mediated communication has contributed to the professional socialisation of students by addressing four issues. First, it has helped students to define the profession in which they will work and to realise that they a.e responsible for the development of the knowledge and skills needed to become a member of the teaching profession. Second, they have developed an understanding of the professional life of teachers and the nature of teachers' work. Third, they have come to realise that there is a body of knowledge that they need to access in order to be educated about the profession, and finally they have developed a sense of professional identity.

The combination of learning from three interacting sources of information of a Knowledge-Building Community (KBC): community learning; school-based learning and problem-based learning have enhanced the process of professional socialisation. Also the evidence from the forum, written assignments, interviews and school visits suggests that the KBC process helped students to develop an understanding of the following: norms of service, specialised 'teacher' knowledge, teacher autonomy in exercising professional judgment, teacher autonomy in setting educational requirements and standards of service, and the existence of a code of ethics of the profession. They have also learnt about the professional life of teachers - the language of the profession, belief systems, symbolic lives. Also by performing a professional role in schools they have developed some sense of professional identity.

We also learnt that when students use computer-mediated communication in a KBC they can be very creative and forthright in sharing opinions and ideas. However, like face-to-face conversation, they can deviate from intended pathways and lecturers need to continually monitor the discussion and provide input at appropriate moments – just establishing the community forum is not enough.

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